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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,646	11/09/2001	Christopher Loren Platt	SEAG 47948	7315

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EXAMINER
BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
1773	5

DATE MAILED: 08/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/008,646	PLATT, CHRISTOPHER LOREN	
	Examiner	Art Unit	
	Kevin M Bernatz	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-34,36 and 37* is/are pending in the application.

4a) Of the above claim(s) *22-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11-21,34,36 and 37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-9,11-34,36 and 37* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Amendments to claims 1, 9, 10, 19, 34 and 35, filed on June 12, 2003, have been entered in the above-identified application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Examiner's Comments

3. With regard to the transitional phrase "consisting essentially of", the examiner reminds applicants that "[t]he transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention. *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original)" (MPEP § 2111.03). The MPEP explicitly states "[f]or search and examination purposes, absent a clear indication in the specification of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising.".

In the instant case, the basic and novel characteristic(s) of the claimed invention are deemed an antiferromagnetic alloy possessing a high blocking temperature and capable of being formed in a (200) crystal texture.

The MPEP further states "[w]hen an applicant contends that additional steps or materials in the prior art are excluded by the recitation of "consisting essentially of,"

applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristics of applicant's invention". In the court case cited in the MPEP, it should be noted the court's finding that "the court noted that appellants' specification indicated the claimed composition can contain any well-known additive such as a dispersant, and there was no evidence that the presence of a dispersant would materially affect the basic and novel characteristic of the claimed invention. ***The prior art composition had the same basic and novel characteristic (increased oxidation resistance) as well as additional enhanced detergent and dispersant characteristics***" [emphasis added] MPEP § 2111.03.

In the instant case, there is currently no evidence of record that additional elements would materially effect the basic and novel characteristics of the claimed invention, namely the ability of the IrMn alloy to achieve a high blocking temperature and a (200) crystal texture.

Election/Restrictions

4. Applicant's election of Group I, claims 1 – 21 and 34 - 37 in Paper No. 4 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Claims 22 – 33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. The restriction requirement is still deemed proper and is therefore made **FINAL**.

Claim Rejections - 35 USC § 103

5. Claims 1 – 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. ('170 A1) in view of Fuke et al. ('049).

Regarding claim 1, Lin et al. disclose a film comprising an Mn alloy layer (i.e. IrMnNi) having a (200) texture (*Figure 13 – AFM layer; Paragraphs 0014; 0050; and 0061; and claim 2*).

Lin et al. fail to disclose using a Mn alloy consisting essentially of IrMnN film.

However, Fuke et al. teach using a Mn alloy consisting essentially of IrMnN (*col. 5, lines 33 – 55; Figures 3 – 9*) as an antiferromagnetic material for use in magnetic heads since such an alloy possesses good corrosion resistance (*col. 5, lines 42 – 45*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Lin et al. to use a IrMnN alloy as taught by Fuke et al., since such an alloy possesses good corrosion resistance.

Regarding claims 2 - 5, Fuke et al. disclose overlapping concentrations and that the exact alloy compositions are cause effective variables in terms of the blocking temperature and bias magnetic field (*col. 2, lines 57 – 67; col. 5, lines 54 – 55; and Figures 3 – 9*). It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the Ir, Mn and N concentrations through routine experimentation, especially given the Fuke et al. teachings. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d

1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 6, Fuke et al. disclose thickness values meeting applicants' claimed limitations for controlling the exchange coupling forces of the antiferromagnetic IrMnN film in MR sensors (*col. 1, lines 6 – 11 and col. 7, lines 18 – 33*). It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the film thickness through routine experimentation, especially given the Fuke et al. teachings.

Regarding claims 7 and 8, the limitation(s) "is an exchange biasing layer" and "is a seed layer" are (an) intended use limitation(s) and are not further limiting in so far as the structure of the product is concerned. "[I]n apparatus, article, and composition claims, intended use must result in a ***structural difference*** between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. ***If the prior art structure is capable of performing the intended use, then it meets the claim***. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art." [emphasis added] *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963). See MPEP § 2111.02.

6. Claims 9, 11 – 13, 15, 17 – 21, 34, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. ('170 A1) in view of Fuke et al. ('049) as applied above, and further in view of Tanaka et al. (IEEE Trans. Mag., 35(2),

1999, 700 – 705), Xue et al. (U.S. Patent No. 6,278,592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728), and further evidenced by Barnard et al. (U.S. Patent No. 5,919,580) and Fuke et al. (App. Phys. Let., 75(23), 1999, 3680 – 3682).

Regarding claims 9, 17, 21, 34 and 36, Lin et al. in view of Fuke et al. disclose are relied upon as described above. Specifically, Lin et al. in view of Fuke et al. disclose a top-type spin valve sensor comprising a layered magnetic structure (*Figure 13*) comprising an IrMnN layer having a (200) texture (*AFM layer*); and a ferromagnetic layer (*Pinned layer*).

Neither Lin et al. nor Fuke et al. disclose the ferromagnetic layer (i.e. "pinned layer") deposited on the IrMnN layer (i.e. above the antiferromagnetic layer), nor a blocking temperature of an IrMnN alloy meeting applicants' claimed temperature limitation.

However, regarding the structural limitation "a ferromagnetic layer deposited on a layer consisting essentially of IrMnN", Tanaka et al. teach that top-type spin valve sensors (substrate/free/non/pinned/antiferromagnetic) are known equivalent structures to bottom-type spin valve sensors (substrate/antiferromagnetic/pinned/non/free), which results in the ferromagnetic layer (i.e. "pinned layer") being deposited on the IrMnN layer (i.e. "antiferromagnetic layer") (*Abstract*). Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). In the instant case,

a top-type spin valve sensor and a bottom-type spin valve sensor are equivalents in the field of spin valve sensor structures, both accomplishing the same function.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Lin et al. in view of Fuke et al. to deposit the ferromagnetic layer on the IrMnN antiferromagnetic layer as taught by Tanaka et al. since such a structure is a known equivalent to the Lin et al. structure, and substitution of known equivalents requires no express motivation in the art.

Regarding the limitation "a blocking temperature of greater than 300 °C", Xue et al. and Anderson et al. teach the importance of using antiferromagnetic layers having high blocking temperatures inorder to produce antiferromagnetic layers possessing good thermal stability (*Anderson et al. – Abstract and underlined sections*) and good control of the magnetic properties (*Xue et al. – col. 4, lines 7 – 8*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the blocking temperature through routine experimentation, especially given the teaching in Xue et al. and Anderson et al. regarding the desire to maximize the blocking temperature to produce thermally stable antiferromagnetic layers capable of good control of the magnetic properties. The Examiner notes that Fuke et al. provides evidence that the blocking temperature of IrMnX alloys can be optimized by optimizing the additive, X, concentration (*Abstract and Figure 5*), while Barnard et al. provides evidence that oxygen and nitrogen are known equivalent non-metallic additives to antiferromagnetic alloys (*col. 3, lines 8 – 13*).

Regarding claims 11 and 12, Fuke et al. disclose overlapping concentrations and that the exact alloy compositions are cause effective variables in terms of the blocking temperature and bias magnetic field (*col. 2, lines 57 – 67; col. 5, lines 54 – 55; and Figures 3 – 9 and as evidenced by Fuke et al., App. Phys. Let., Figure 5*). It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the Ir, Mn and N concentrations through routine experimentation, especially given the Fuke et al. teachings.

Regarding claim 13, Fuke et al. disclose thickness values meeting applicants' claimed limitations for controlling the exchange coupling forces of the antiferromagnetic IrMnN film in MR sensors (*col. 1, lines 6 – 11 and col. 7, lines 18 – 33*). It would, therefore, have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the film thickness through routine experimentation, especially given the Fuke et al. teachings.

Regarding claim 15, Lin et al. in view of Tanaka et al. disclose a plurality of ferromagnetic layers deposited on the antiferromagnetic layer (*pinned and free layers; Tanaka et al.: Abstract; Section II; Lin et al.: Figure 13 – FL1 and FL2*).

Regarding claims 18 and 37, Tanaka et al. disclose that the antiferromagnetic layer and the ferromagnetic layers are exchange coupled in both top-type and bottom-type spin valve sensors (*Introduction section – 2nd column*).

Regarding claim 19, Tanaka et al. disclose depositing the antiferromagnetic layer on a substrate in the bottom-type spin valve sensor (*Abstract*).

Regarding claim 20, the limitation "A soft magnetic underlayer of a perpendicular magnetic recording media" is a pre-amble limitation and is not further limiting in so far as the structure of the "layered magnetic structure" is concerned. "[A] preamble is generally not accorded any patentable weight where it merely recites the purpose of a process ***or the intended use of a structure***, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976)" MPEP § 2111.02 (emphasis added). Furthermore, the examiner notes that "[i]f the prior art structure is capable of performing the intended use, then it meets the claim" MPEP § 2111.02. In the instant case, the prior art structure, while disclosed for use in a spin-valve sensor would be capable of use wherever soft/antiferromagnetic layer structures were used.

7. Claims 14 and 16 rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. ('170 A1) in view of Fuke et al. ('049), Tanaka et al. (IEEE Trans. Mag., 35(2), 1999, 700 – 705), Xue et al. ('592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728), and further evidenced by Barnard et al. ('580) and Fuke et al. (App. Phys. Let., 75(23), 1999, 3680 – 3682) as applied above, and further in view of Saito et al. ('067).

Lin et al. ('170 A1) in view of Fuke et al. ('049), Tanaka et al. (IEEE Trans. Mag., 35(2), 1999, 700 – 705), Xue et al. ('592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728) are relied upon as described above.

None of the above disclose a layered magnetic structure comprising a plurality of antiferromagnetic and ferromagnetic layers.

However, Saito et al. teach that forming a layered magnetic structure comprising a plurality of ferromagnetic and antiferromagnetic layers meeting applicant's claimed numerical limitations (i.e. "from 2 to 40" – claim 16) results in a more stable bias field (*col. 10, lines 53 – 65; col. 11, lines 7 – 12; and Figures 3 and 4*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Lin et al. ('170 A1) in view of Fuke et al. ('049), Tanaka et al. (IEEE Trans. Mag., 35(2), 1999, 700 – 705), Xue et al. ('592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728) to include a plurality of ferromagnetic and antiferromagnetic layers meeting applicant's claimed numerical limitations as taught by Saito et al. inorder to make the bias field more stable.

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. ('170 A1) in view of Fuke et al. ('049), Tanaka et al. (IEEE Trans. Mag., 35(2), 1999, 700 – 705), Xue et al. ('592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728), and further evidenced by Barnard et al. ('580) and Fuke et al. (App. Phys. Let., 75(23), 1999, 3680 – 3682) as applied above, and further in view of Hikosaka et al. ('342) and applicant's admissions.

Lin et al. ('170 A1) in view of Fuke et al. ('049), Tanaka et al. (IEEE Trans. Mag., 35(2), 1999, 700 – 705), Xue et al. ('592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728) are relied upon as described above.

None of the above explicitly disclose the preamble limitation "[a] soft magnetic underlayer of a perpendicular magnetic recording media", nor whether GMR films and perpendicular films are analogous art.

However, applicant's admit that "[i]n addition to their use in GMR sensors, multi-layer magnetic films may be used in perpendicular magnetic recording media. Conventional perpendicular recording media typically include a hard magnetic recording layer and a soft magnetic underlayer..." (*page 2, lines 20 – 22*).

In addition, Hikosaka et al. teach that soft magnetic underlayers of perpendicular recording media are known to include both antiferromagnetic layers and ferromagnetic layers (*Figures 4 and 5; col. 9, lines 23 – 36; col. 10, lines 17 – 21; and col. 10, line 61 bridging col. 11, line 3*), wherein such a structure prevents the generation of the domain walls in the soft ferromagnetic layer and a bias magnetic field is readily applied to the soft ferromagnetic layers (*col. 9, lines 30 – 36; and col. 9, line 65 bridging col. 10, line 16*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Lin et al. ('170 A1) in view of Fuke et al. ('049), Tanaka et al. (IEEE Trans. Mag., 35(2), 1999, 700 – 705), Xue et al. ('592 B1) and Anderson et al. (J. App. Phys., 87(9), 2000, 5726 – 5728) to be used as a soft magnetic underlayer of a perpendicular magnetic recording media as taught by Hikosaka et al. and applicants, since Hikosaka et al. teach that such an intended use is known in the art to produce a structure that prevents the generation of the domain walls

in the soft ferromagnetic layer and allows a bias magnetic field to be readily applied to the soft ferromagnetic layers.

Response to Arguments

9. The rejection of claims 1 - 8 under 35 U.S.C § 103(a) – Lin et al. in view of Fuke et al.

Applicant(s) argue(s) that since Lin et al. requires a seed layer to induce the (200) texture in the antiferromagnetic layer, this is different than the claimed IrMnN film with a (200) texture. The examiner respectfully disagrees.

While Lin et al. requires the existence of the seed layer to induce the (200) texture in the Mn alloy antiferromagnetic layer, the Examiner notes that applicants' claims are open to seed layers/underlayers being present to induce such a texture. Should applicants desire to exclude seed layers/underlayers, applicants are suggested to include additional structural limitations wherein the IrMnN layer can be distinctly claimed to be "directly deposited" on a non seed layer/underlayer. However, as the claims presently stand, the method by which the layer obtains a (200) texture is not relevant for patentability determination, *provided that the layer does indeed possess such a (200) texture*.

Applicants' further argue that Fuke et al. teach only a (111) texture IrMnN film and therefore does not read on the claimed (200) textured IrMnN film.

Applicants are reminded that the test of obviousness is not express suggestion of the claimed invention in any or all references but rather what the references taken

collectively would suggest to those of ordinary skill in the art presumed to be familiar with them. *In re Rosselet*, 347 F.2d 847, 146 USPQ 183 (CCPA 1965); *In re Hedges*, 783 F.2d 1038; *Ex parte Martin* 215 USPQ 543, 544 (PO BdPatApp 1981). In the instant case, Lin et al. provide a clear teaching that the (200) texture is desired in the antiferromagnetic alloy and can be obtained by proper seed layer/under layer selection. Fuke et al. is merely relied upon to teach that IrMnN alloys are known in the art.

10. The rejection of claims 9 – 21 and 34 - 37 under 35 U.S.C § 103(a) – Lin et al. in view of Fuke et al. and various additional references

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Applicants' amendment resulted in embodiments not previously considered (i.e. "consisting essentially of" and "a blocking temperature greater than 300 °C") which necessitated the new grounds of rejection, and hence the finality of this action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

KMB
August 2, 2003

Paul Thibodeau
Supervisory Patent Examiner
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